

MOSFET – P-Channel, QFET®

-100 V, -16.5 A, 190 mΩ

FQP17P10

General Description

This P-Channel enhancement mode power MOSFET is produced using onsemi's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

Features

- -16.5 A, -100 V, $R_{DS(on)}$ = 190 mΩ (Max.) at $V_{GS} = -10$ V, $I_D = -8.25$ A
- Low Gate Charge (Typ. 30 nC)
- Low C_{RSS} (Typ. 100 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating
- This is a Pb-Free Device

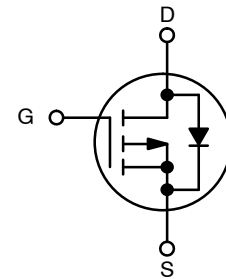
ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | | Ratings | Unit |
|-----------------------------------|--|-------------------------------------|-------------|------|
| V _{DSS} | Drain–Source Voltage | | –100 | V |
| I _D | Drain Current | Continuous (T _C = 25°C) | –16.5 | A |
| | | Continuous (T _C = 100°C) | –11.7 | |
| I _{DM} | Drain Current | Pulsed (Note 1) | –66 | A |
| V _{GSS} | Gate–Source Voltage | | ±30 | V |
| E _{AS} | Single Pulse Avalanche Energy (Note 2) | | 580 | mJ |
| I _{AR} | Avalanche Current (Note 1) | | –16.5 | A |
| E _{AR} | Repetitive Avalanche Energy (Note 1) | | 10 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | | –6.0 | V/ns |
| P _D | Power Dissipation | (T _C = 25°C) | 100 | W |
| | | Derate above 25°C | 0.67 | W/°C |
| T _J , T _{STG} | Operating and Storage Temperature Range | | –55 to +175 | °C |
| T _L | Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds | | 300 | °C |

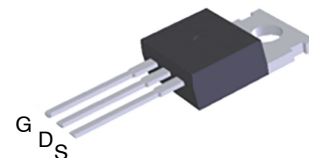
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. $L = 3.2$ mH, $I_{AS} = -16.5$ A, $V_{DD} = -25$ V, $R_G = 25$ Ω, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq -16.5$ A, $di/dt \leq 300$ A/μs, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

| V_{DS} | $R_{DS(ON)}$ MAX | I_D MAX |
|----------|------------------|-----------|
| -100 V | 0.19 Ω @ -10 V | -16.5 A |

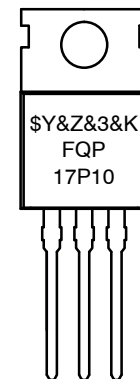


P-Channel MOSFET



TO-220-3LD
CASE 340AT

MARKING DIAGRAM



| | |
|----------|---------------------------|
| \$Y | = onsemi Logo |
| &Z | = Assembly Plant Code |
| &3 | = Data Code (Year & Week) |
| &K | = Lot Code |
| FQP17P10 | = Specific Device Code |

ORDERING INFORMATION

| Device | Package | Shipping |
|----------|-------------------------|-------------------|
| FQP17P10 | TO-220-3LD (Pb-Free) | 50 Units/ Tube |

FQP17P10

THERMAL CHARACTERISTICS

| Symbol | Parameter | Ratings | Unit |
|-----------------|---|---------|------|
| $R_{\theta JC}$ | Maximum Thermal Resistance, Junction to Case | 1.5 | °C/W |
| $R_{\theta CS}$ | Thermal Resistance, Case-to-Sink, Typ. | 0.5 | °C/W |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient | 62.5 | °C/W |

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------|-----------|----------------|------|------|------|------|
|--------|-----------|----------------|------|------|------|------|

OFF CHARACTERISTICS

| | | | | | | |
|--------------------------------|---|--|------|------|------|---------------|
| BV_{DSS} | Drain to Source Breakdown Voltage | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | -100 | – | – | V |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C | – | -0.1 | – | V/°C |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = -100\text{ V}, V_{GS} = 0\text{ V}$ | – | – | -1 | μA |
| | | $V_{DS} = -80\text{ V}, T_C = 150^\circ\text{C}$ | – | – | -10 | |
| I_{GSSF} | Gate –Body Leakage Current, Forward | $V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$ | – | – | -100 | nA |
| I_{GSSR} | Gate –Body Leakage Current, Reverse | $V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$ | | | 100 | nA |

ON CHARACTERISTICS

| | | | | | | |
|--------------|-----------------------------------|--|------|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | -2.0 | – | -4.0 | V |
| $R_{DS(on)}$ | Static Drain–Source On–Resistance | $V_{GS} = -10\text{ V}, I_D = -8.25\text{ A}$ | – | 0.14 | 0.19 | Ω |
| g_{FS} | Forward Transconductance | $V_{DS} = -40\text{ V}, I_D = -8.25\text{ A}$ | – | 9.9 | – | S |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|-----------|------------------------------|--|---|-----|------|----|
| C_{iss} | Input Capacitance | $V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$ | – | 850 | 1100 | pF |
| C_{oss} | Output Capacitance | | – | 310 | 400 | pF |
| C_{rss} | Reverse Transfer Capacitance | | – | 100 | 130 | pF |

SWITCHING CHARACTERISTICS

| | | | | | | |
|--------------|---------------------|---|---|-----|-----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = -50\text{ V}, I_D = -16.5\text{ A}, R_G = 25\text{ }\Omega$ (Note 4) | – | 17 | 45 | ns |
| t_r | Turn-On Rise Time | | – | 200 | 410 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | – | 45 | 100 | ns |
| t_f | Turn-Off Fall Time | | – | 100 | 210 | ns |
| Q_g | Total Gate Charge | $V_{DS} = -80\text{ V}, I_D = -16.5\text{ A}, V_{GS} = -10\text{ V}$ (Note 4) | – | 30 | 39 | nC |
| Q_{gs} | Gate–Source Charge | | – | 4.8 | – | nC |
| Q_{gd} | Gate–Drain Charge | | – | 17 | – | nC |

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

| | | | | | | |
|----------|---|---|---|------|-------|---------------|
| I_S | Maximum Continuous Drain–Source Diode Forward Current | | – | – | -16.5 | A |
| I_{SM} | Maximum Pulsed Drain–Source Diode Forward Current | | – | – | -66 | A |
| V_{SD} | Drain–Source Diode Forward Voltage | $V_{GS} = 0\text{ V}, I_S = -16.5\text{ A}$ | – | – | -4.0 | V |
| t_{rr} | Reverse Recovery Time | $V_{GS} = 0\text{ V}, I_S = -16.5\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$ | – | 120 | – | ns |
| Q_{rr} | Reverse Recovery Charge | | – | 0.52 | – | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

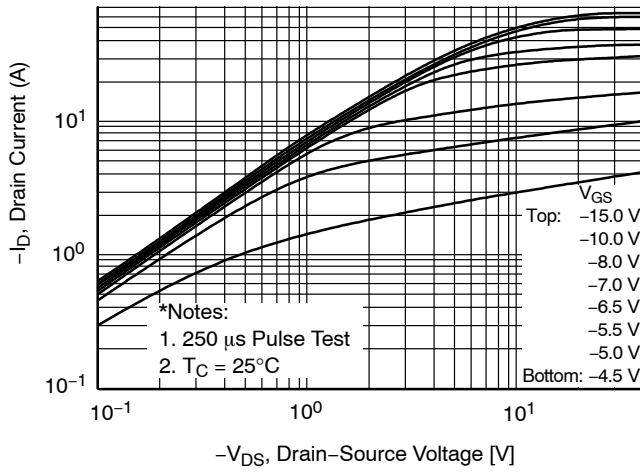


Figure 1. On-Region Characteristics

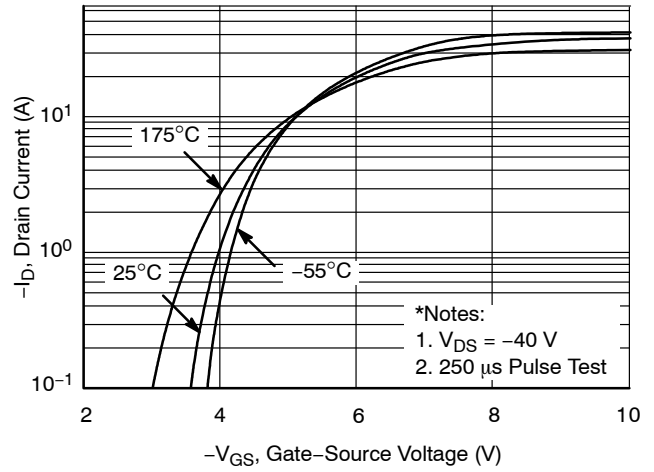


Figure 2. Transfer Characteristics

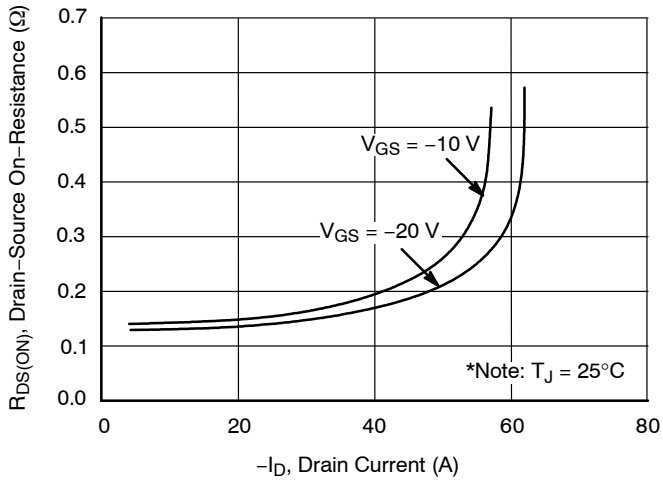


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

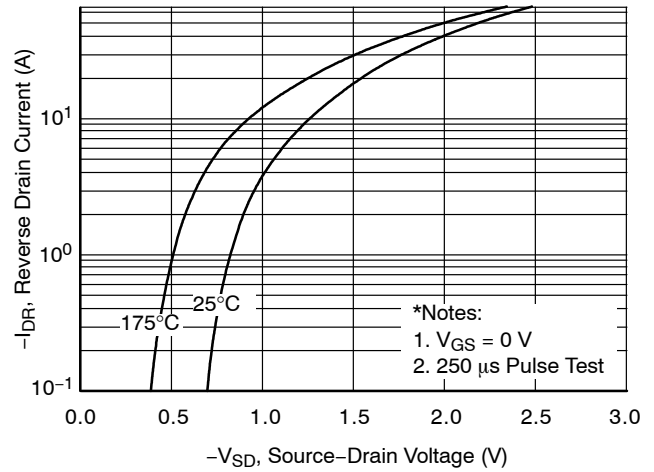


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

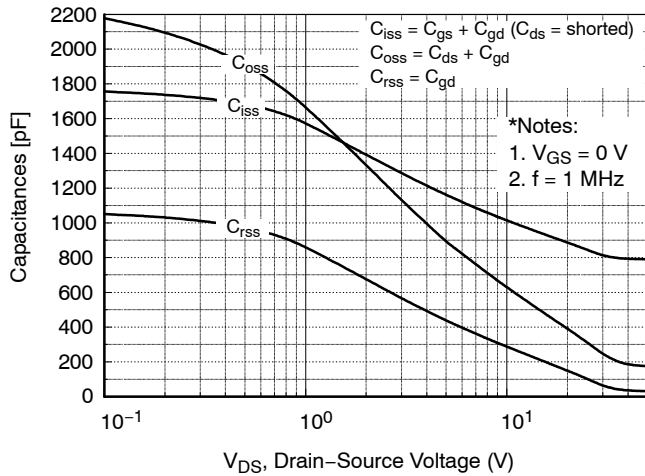


Figure 5. Capacitance Characteristics

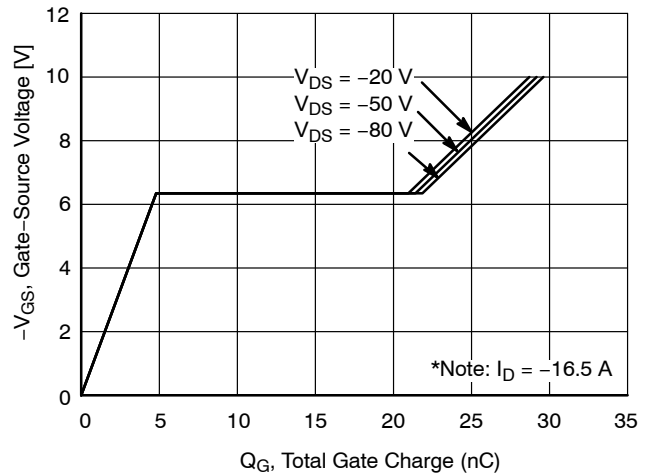


Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (continued)

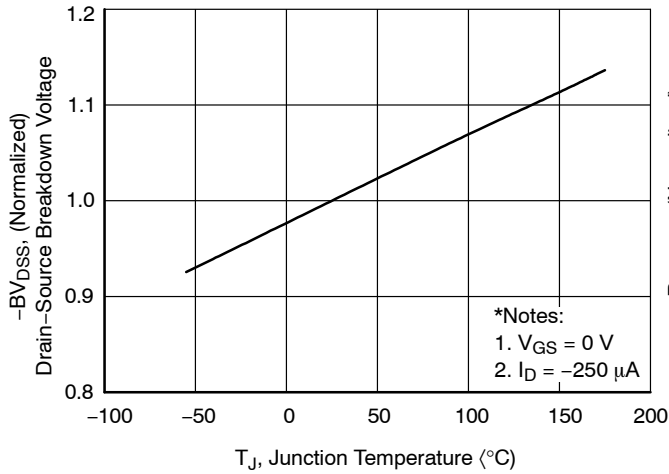


Figure 7. Breakdown Voltage Variation vs. Temperature

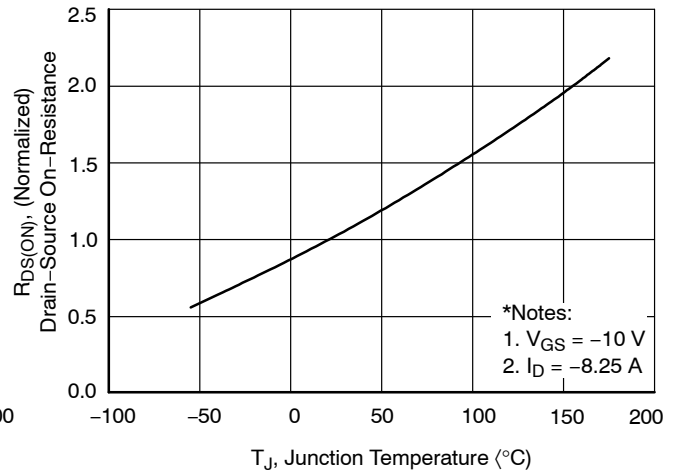


Figure 8. On-Resistance Variation vs. Temperature

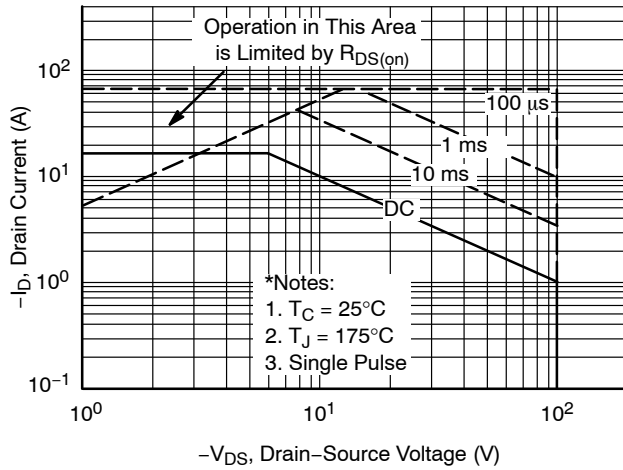


Figure 9. Maximum Safe Operating Area

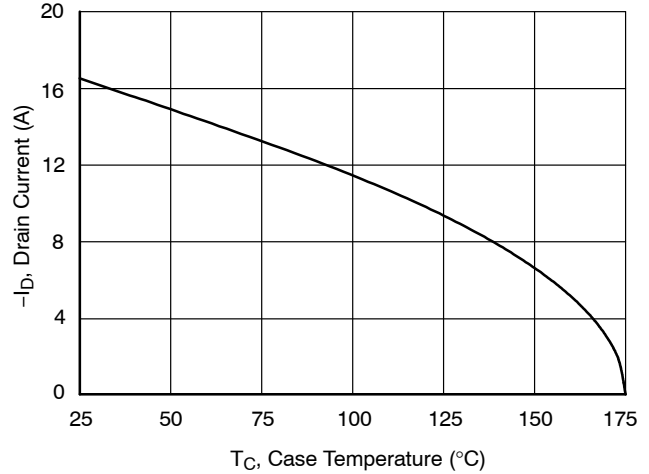


Figure 10. Maximum Drain Current vs. Case Temperature

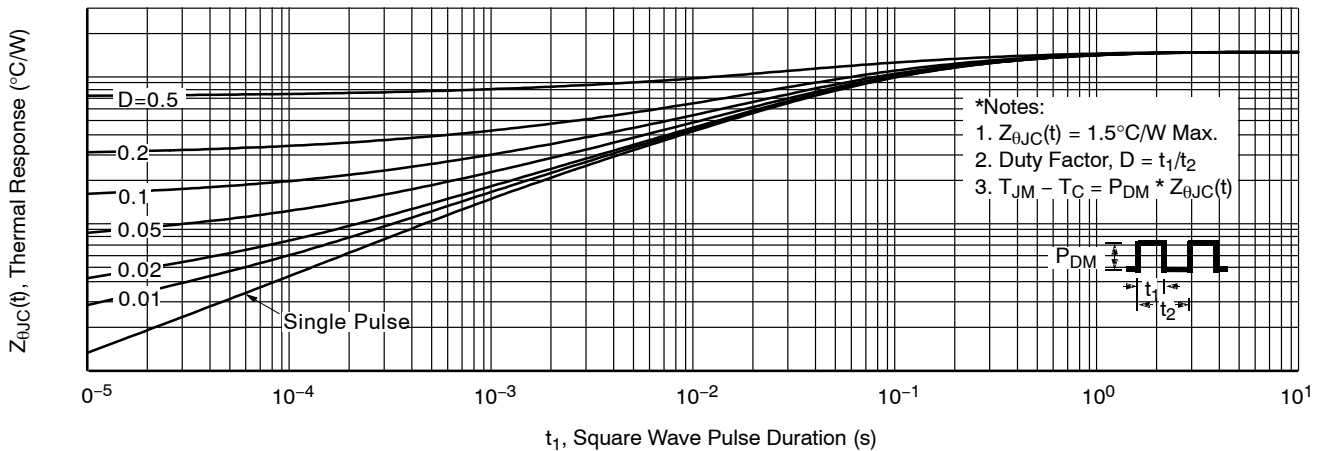


Figure 11. Transient Thermal Response Curve

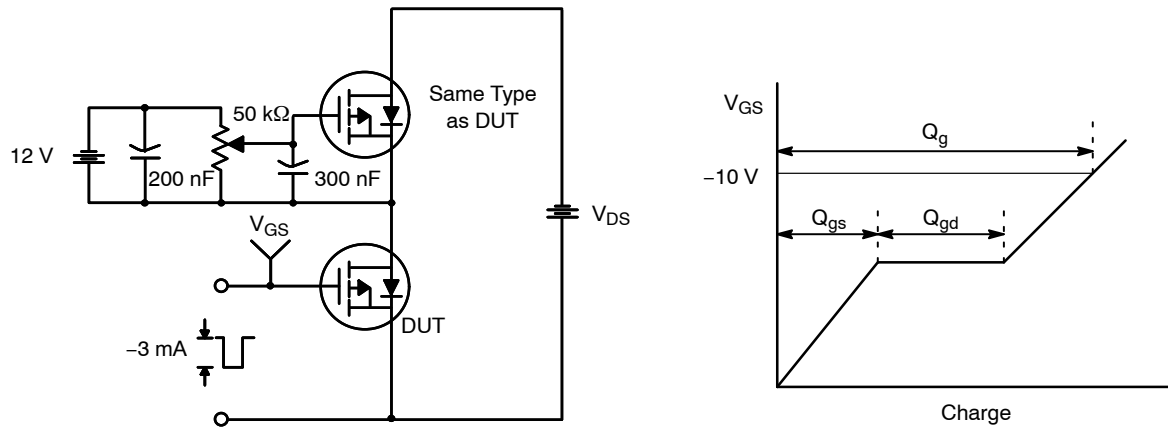


Figure 12. Gate Charge Test Circuit & Waveform

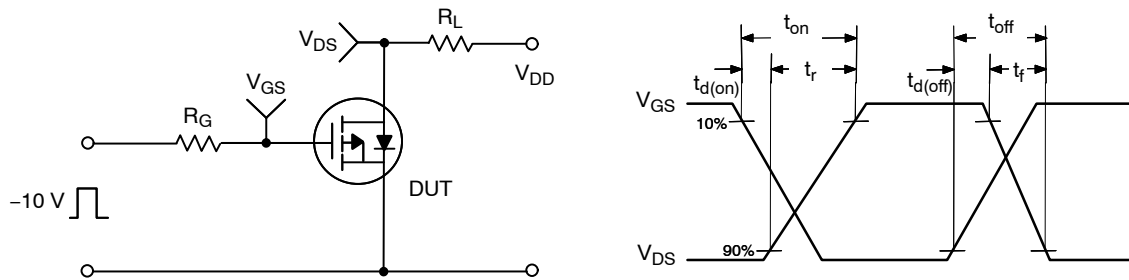


Figure 13. Resistive Switching Test Circuit & Waveforms

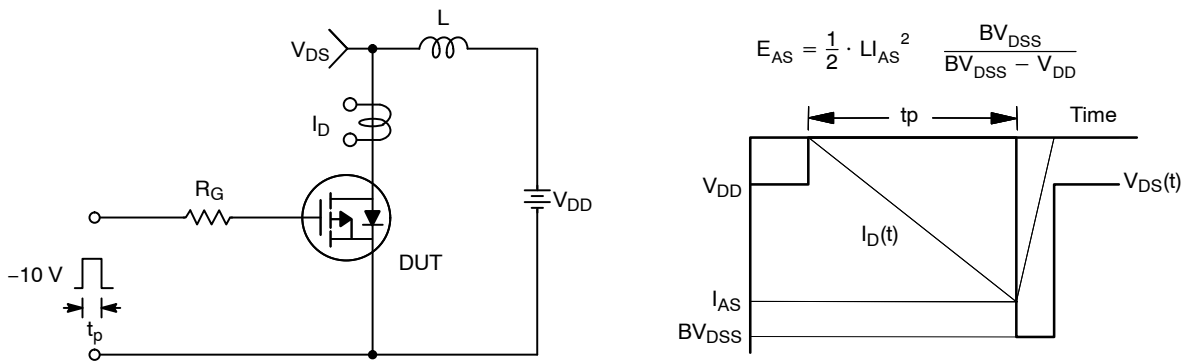


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

FQP17P10

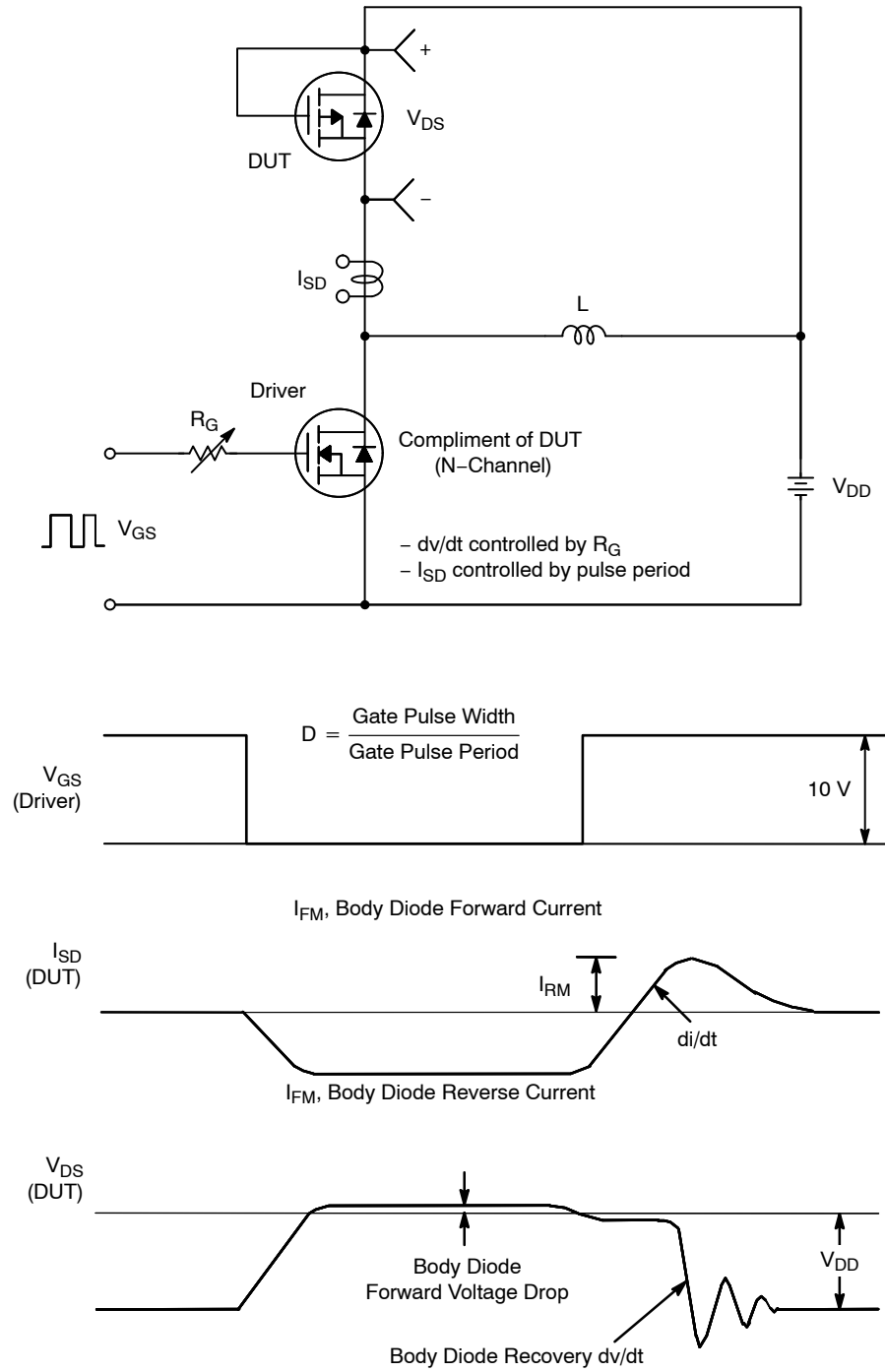
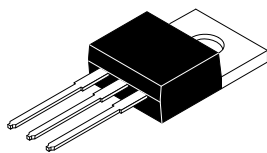


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

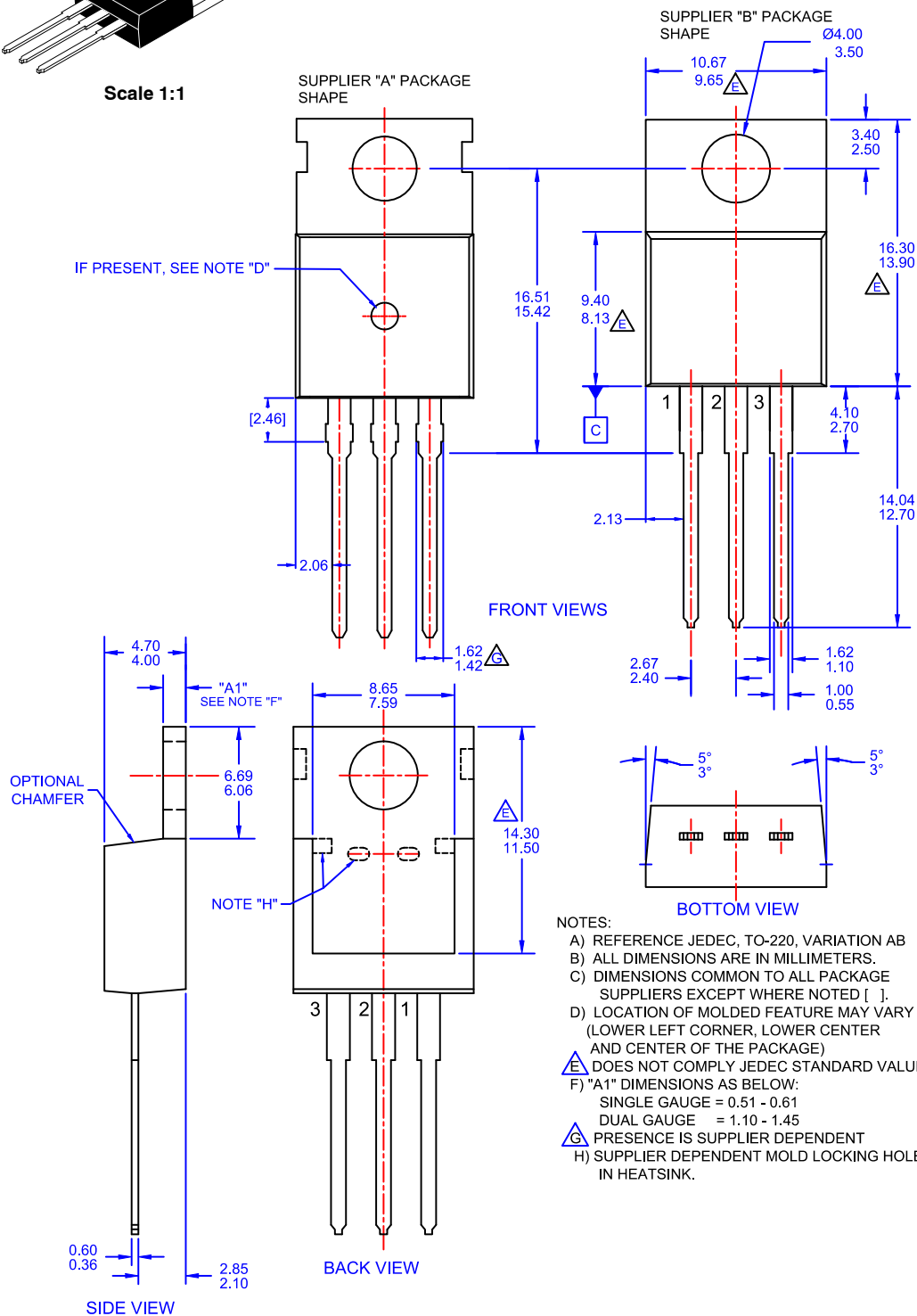
ON Semiconductor®



Scale 1:1

TO-220-3LD CASE 340AT ISSUE A

DATE 03 OCT 2017



NOTES:

- REFERENCE JEDEC, TO-220, VARIATION AB
- ALL DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS COMMON TO ALL PACKAGE SUPPLIERS EXCEPT WHERE NOTED [].
- LOCATION OF MOLDED FEATURE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
- DOES NOT COMPLY JEDEC STANDARD VALUE.
- "A1" DIMENSIONS AS BELOW:
 - SINGLE GAUGE = 0.51 - 0.61
 - DUAL GAUGE = 1.10 - 1.45
- PRESENCE IS SUPPLIER DEPENDENT
- SUPPLIER DEPENDENT MOLD LOCKING HOLES IN HEATSINK.

| | | |
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